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REGIONAL OCCURRENCE OF A SEVERE INFESTATION OF *SIMULIUM SLOSSONAE* (DIPTERA: SIMULIIDAE) ASSOCIATED WITH AN EL NIÑO EVENT IN FLORIDA

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Abstract

A severe infestation of adult host-seeking black flies (Diptera: Simuliidae) occurred in west central Florida during 1998. Collections from stationary suction traps in Pasco County revealed the presence of large numbers of *Simulium slossonae* Dyar and Shannon. This species peaked in traps during March (avg >40 per trap) with a lesser secondary peak in October (avg ≈5 per trap). Moreover, during March, some suction traps had collected as many as 2,000 black flies for the month. It was believed that the spring outbreak of *S. slossonae* was the result of above average precipitation associated with an El Niño event. Precipitation produced by this weather system during the winter of 1997/1998 provided a continuous source of rain-swollen ditches, streams, and creeks for rapid larval and adult production the following spring. Conversely, 1999 resulted in rainfall deficits of 1.5 cm to nearly 7.0 cm below normal. During that year, adult black fly populations were almost nonexistent (≤3 black flies collected per trap month) compared with collections obtained the previous year.

Key Words: Black fly, aquatic arthropods, El Niño, stream ecology

Resumen

Una infestación severa de adultos de la mosca negra (Diptera: Simuliidae) en busqueda de hospederos ocurrió en el oeste central de la Florida durante el 1998. La recolección de moscas en trampas de succión estacionarias en el condado de Pasco reveló la presencia de un alto número de *Simulium slossonae* Dyar y Shannon. El número mas alto de esta especie recolectados en las trampas fue durante el marzo (promedio de >40 por trampa) con el segundo número mas alto en octubre (promedio = 5 por trampa). Además, durante el marzo, algunos de las trampas de succión recollectaron hasta 2,000 moscas negras por el mes. Se cree que la erupción de la población de *S. slossonae* en la primavera fue debido a la precipitación mas alta que el promedio asociada con el evento de El Niño. La precipitación producida por esta sistema de tiempo durante el invierno de 1997/1998 proveyó un fuente continuo de zanjas llenas por la lluvia, quebradas, y arroyos para la producción rapida de las larvas y los adultos en la primavera siguiente. Al contrario, el 1999 resultó en un déficit de lluvia de 1.5 cm hasta casi 7.0 cm menos del normal. Durante aquel año, la población de adultos de la mosca negra fue casi no existente (≤3 moscas negras recolectadas por trampa por mes) comparada con la recolecciones obtenidas el año anterior.

Adult host-seeking black flies (*Simulium* spp.) can often be severe biting pests of humans. The irritation associated with these bites can be considerable and can often make life miserable in areas where black fly populations are in great abundance. Moreover, bites may become itchy and swollen for a number of days. In sensitized individuals reaction to black fly saliva injected at the feeding site may cause a syndrome known as "black fly fever" that consists of headaches, fever, nausea, and/or inflammation of nymph nodes (Harwood & James 1979).

Larval habitats for black flies primarily consist of swift running water, with shallow mountain torrents being favored places (Harwood & James 1979). In Florida, these habitats are not present. Stone & Snoddy (1969) reported that some species prefer slow flowing streams and swamp rivers. These habitats are ubiquitous throughout the State. In 1998, a severe outbreak of adult *Simulium slossonae* Dyar and Shannon occurred in west central Florida (particularly Pasco County). Several reports of chicken mortality caused by adult black fly feeding had been reported in the State during the first three months of that year (Butler & Hogsette 1998). Although this species is primarily a bird feeder, large swarms were often attracted to people causing considerable annoyance (Butler & Hogsette 1998). Because this was an unusual event, the authors

wanted to document seasonal occurrence and abundance of this species in Pasco County. In addition, we discuss the climatic events that led up to that outbreak.

Materials and Methods

Black flies were collected in stationary suction traps, primarily used for mosquito population surveillance, by Pasco County Mosquito Control District (PCMCD) personnel from 1997 through 1999. This trap is similar to that described by Bidlingmayer (1971). Collection data were obtained from daily catches from 35 traps placed throughout the District (covering 855 km^2). In 1998, larval samples from submerged vegetation were periodically obtained from rain-swollen streams by PCMCD staff to determine production sites for emerging adults. Adult and larval samples were sent to Peter Adler, Department of Entomology, Clemson University for identification.

U.S. National Oceanic and Atmospheric Administration monthly total precipitation databases (including monthly normal levels) for 1997-1999 were obtained from their data monitoring station at Tampa International Airport (NOAA 1998b, 1999, 2000).

Results and Discussion

Suction trap collections from 1997, revealed that adult *S. slossonae* were present in Pasco County from May through November at an average of ≤2 black flies per trap month (Fig. 1). In 1998, collections of this species started to increase greatly with a primary peak in March and a slight secondary peak in October. During March, some suction traps had collected nearly 2,000 black flies.

Suction traps located along the Anclote River, Pithlachascotee River, and stream systems in the Starkey Management Area, consistently collected the greatest number of adult *S. slossonae*. These watersheds were probably the primary source of black fly infestation in the County and fit the description by Stone & Snoddy (1969) as slow moving southern swamp rivers/creeks favorable for larval development of this species. Indeed, submerged leaves and branches examined from those watersheds revealed several hundred attached *S. slossonae* larvae.

Simulium slossonae has previously been reported to occur widely in Florida with immature and adult specimens collected throughout the year (Stone & Snoddy 1969; Pinkovsky & Butler 1978; Butler & Hogsette 1998). But black fly populations

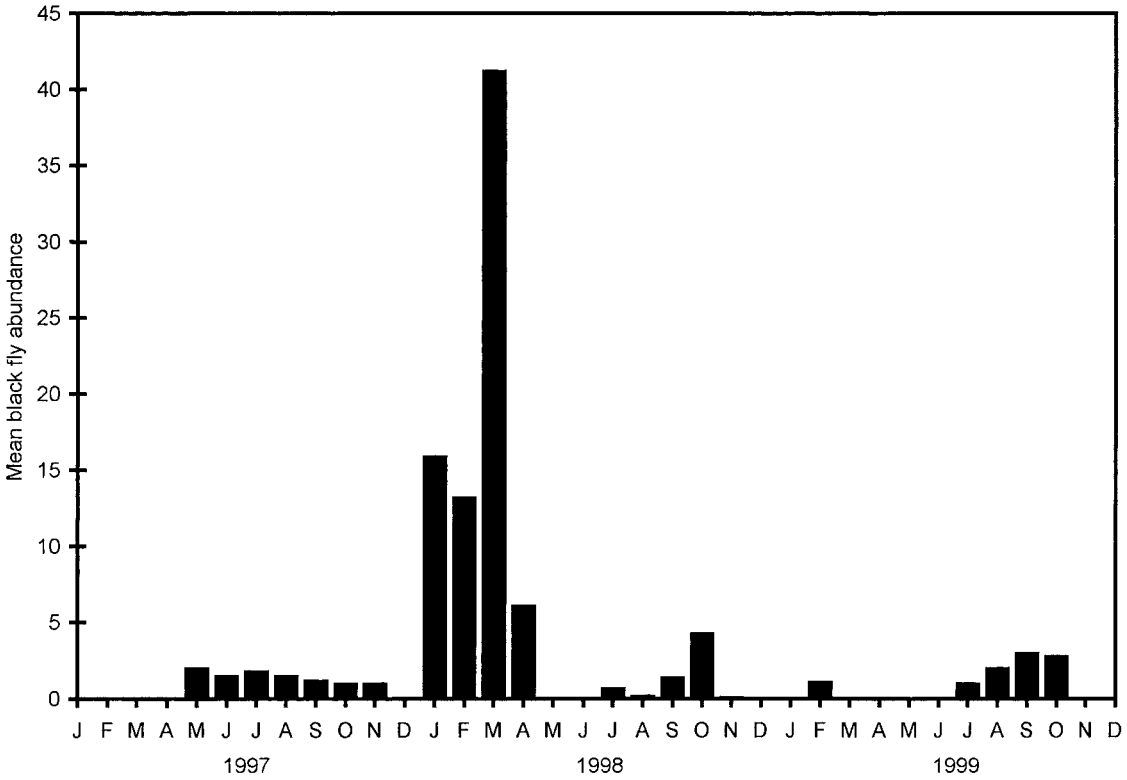

Fig 1. Monthly mean adult *Simulium slossonae* obtained from stationary suction traps, Pasco County, FL, 1997-1999.

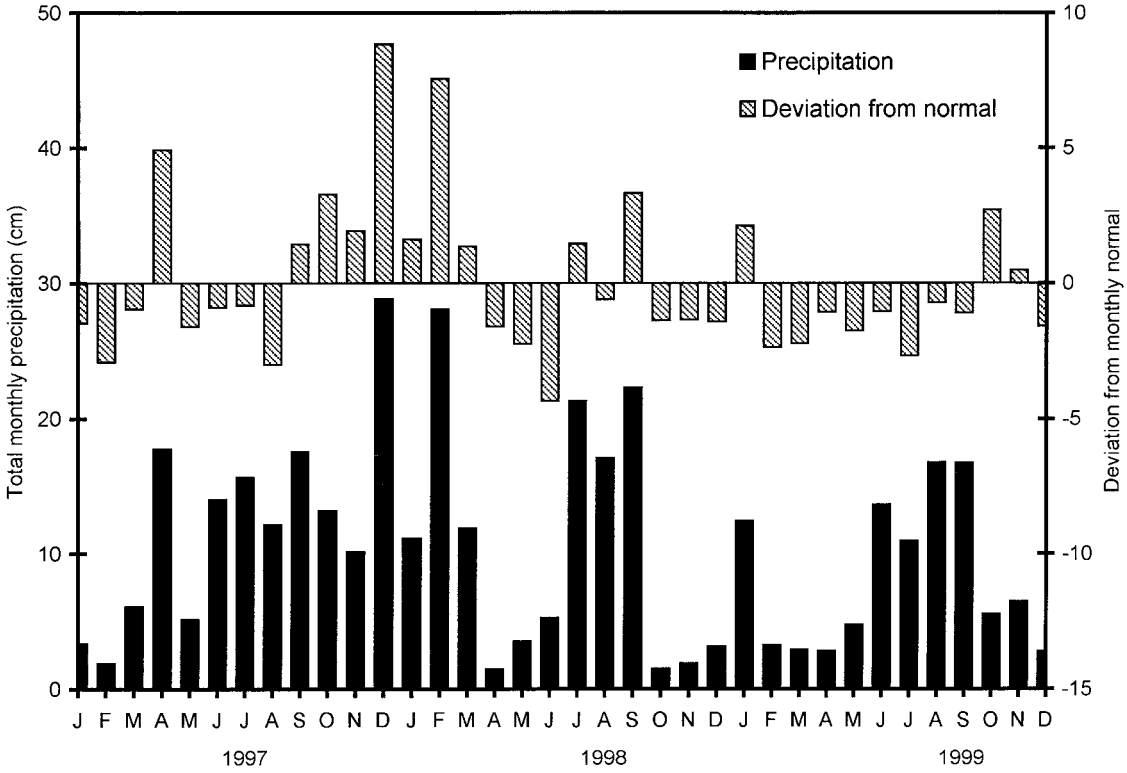

Fig. 2. Monthly total precipitation (cm), and associated deviation from normal, as reported by U. S. National Oceanic and Atmospheric Administration from Tampa International Airport weather data monitoring site, 1997-1999.

reported for the State of Florida had never before increased to the pestiferous levels experienced in 1998. The outbreak of *S. slossonae* during that year appeared to have resulted from above average rainfall during October through December, 1997, and again February, 1998 (Fig. 2). Rainfall was reported to be 8 to 10 times above normal levels in several counties (including Pasco) often swelling stream and river systems to overflow in early 1998 (Morris 1998). Indeed, the National Climatic Data Center (NCDC) reported that the extreme rainfall experienced in central Florida during the latter part of 1997 and beginning of 1998 was associated with El Niño. This event produced 125% to nearly 300% that of normal precipitation levels (NCDC 1998a). According to NCDC, November 1997 to March 1998 had been the wettest reported since records were started in 1895.

During April-June, 1998, adult *S. slossonae* populations had declined considerably (Fig. 1). This period was the driest interval on record (NCDC 1998a). Obviously the precipitation deficits had a limiting effect on larval production (and subsequent adult emergence) through decreased aquatic habitat. During August, rainfall in west central Florida returned to normal or slightly below normal levels (Fig. 2) where, in October, a small peak of adult *S. slossonae* was recorded in traps from Pasco County.

In 1999, adult black fly populations were almost nonexistent (≤3 black flies collected per trap month) (Fig. 1). Larval habitats were not as abundant as the previous year with precipitation levels 1.5 cm to nearly 7.0 cm below normal (Fig. 2).

From our observations, and the data from west central Florida, we found that when above average precipitation events occur in the form of an El Niño weather system, they can trigger a quick build up of adult pestiferous *S. slossonae* populations. Apparently this species can rapidly exploit rain-swollen watershed habitats as larval production areas thereby producing enormous populations of host-seeking adults. Indeed, observations during the first half of 2003, revealed that *S. slossonae* again had risen to pest population levels in Pasco County (J.F.S., unpubl.) by exploiting rain swollen streams produced from another El Niño system during the winter of 2002-2003 (NOAA 2003a, b).

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